By ERIC R. JOHNSON

PCE Energy Prices, 1978-80

THIS article reviews the pattern of changes in the price of personal consumption expenditures (PCE) on energy over the period since 1978, and discusses major factors that help explain that pattern. A chronology of energy-related events and a summary of major legislation that affected energy prices are provided.

Table 1 shows quarterly changes at annual rates in the price of PCE energy as measured by the fixed-weighted price index. In the period covered, quarterly PCE energy price increases varied widely. In 1978, they ranged from 4½ to 9 percent at annual rates. In 1979, increases were larger—ranging from 19½ to 65 percent—and varied widely from quarter to quarter. In 1980, increases decelerated, and, by the third quarter of 1980, dropped back to about rates registered in 1978. These quarterly increases cumulated to a 75-percent increase from the first quarter of 1978 to the third quarter of 1980.

Price changes of two of the PCE energy components—gasoline and oil, which has a weight of about 50 percent in the PCE energy price indexes, and fuel oil and coal, which has a weight of about 13 percent—show the same pattern as the one just described, except that they generally increased more and changed more sharply (chart 11). The major factor affecting them is the price of the crude petroleum (oil) from which they are refined.

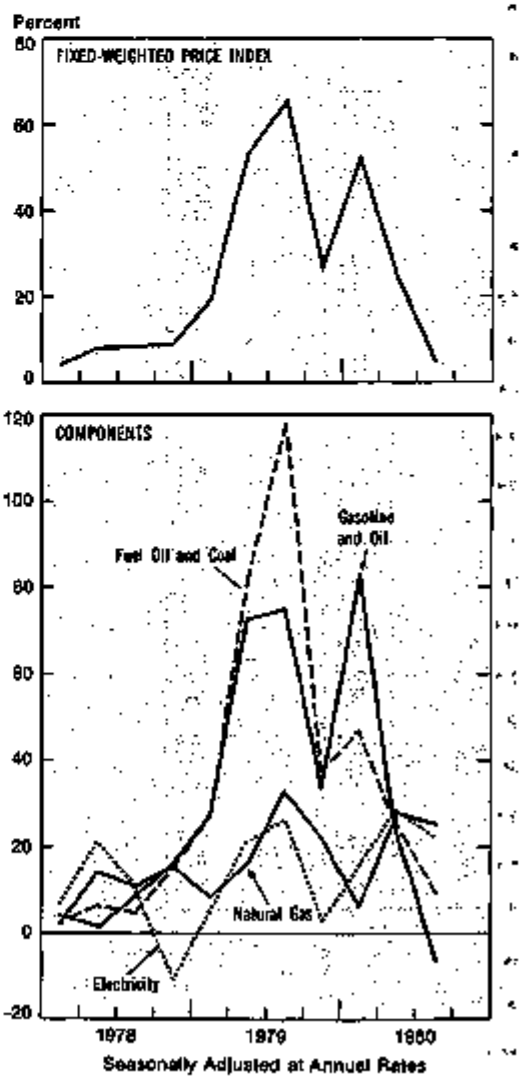
Price changes of electricity and natural gas—the two other components—differed substantially from those of gasoline and fuel oil. In 1978–80, the price of PCE on electricity ranged from a decline at an annual rate of 11 percent to an increase of 28½ percent. The subsequent acceleration was less clearcut than in the case of gasoline and fuel oil. Crude oil and petroleum products are used as inputs to the production of electricity, but most of electricity is produced using other inputs, so that electricity prices reflect other prices as well. The price of PCE on natural gas increased at annual rates varying from 2½ to 16 percent in 1978; in 1979 and 1980, it increased at rates varying from 6½ to 33½ percent. Crude oil prices have only indirect effects on these prices.

Because the price of crude oil is the predominate factor affecting two of the energy components, and is a contributing factor affecting the other two, a discussion of crude oil prices precedes the discussions of the prices of the four PCE energy components.

Crude oil.—Several types of regulation affect the price and supply of crude oil. Federal regulations set maximum prices for categories of domestically

CHART 11

PCE Energy Price:
Change From Preceding Quarter



Seasonally Adjusted at Annual Rates

U.S. Department of Commerce, Bureau of Economic Analysis

Table 1.—Prices of PCE Energy

(Percent change from preceding quarter at annual rates; based on seasonally adjusted index numbers, 1972=100)

	Weights[1]	1978				1979				1980		
		I	II	III	IV	I	II	III	IV	I	II	III[p]
PCE energy price: fixed-weighted price index	100.0	4.4	6.1	8.8	9.1	19.5	53.5	65.2	28.7	32.0	24.5	3.8
Gasoline and oil[2]	49.8	3.9	1.4	9.5	15.6	27.4	72.7	74.5	33.4	67.2	22.5	−6.3
Fuel oil and coal[3]	12.5	3.1	6.5	4.0	14.6	27.8	53.1	118.1	37.7	46.9	24.3	5.0
Electricity	24.6	6.8	20.9	10.6	−11.0	4.5	22.0	25.4	2.9	15.8	28.5	21.7
Natural gas	13.1	2.4	14.4	14.2	15.8	8.8	16.4	33.3	22.1	6.7	27.4	25.6

[p] Preliminary.
1. Percentage of total PCE on energy in 1972.
2. Gasoline, diesel fuel, motor oil, coolant, and related products.
3. Fuel oil, liquified petroleum gas, kerosene, coal, and related products.

produced crude oil; these controls are being phased out, with all controls to end September 30, 1981. A system of cash transfers, or "entitlements," substantially offsets disparities in refiners' acquisition costs that result from the price controls. Customs duties and import fees may be levied on imports, and imports may be restricted. Other Federal regulations include those regarding the leasing of Federal lands and offshore tracts, mandatory allocations to refiners of crude oil, and the stocking of the Strategic Petroleum Reserve.

During 1978–80, the portion of domestic refiners' acquisition of crude oil accounted for by imports varied between 38 and 45 percent: the remaining portion was accounted for by domestically produced crude oil. Prices of imported oil are subject to influences that, to a large extent, are different from those to which prices of domestic oil are subject.

In 1978, the cost of imported crude oil remained virtually unchanged through the third quarter; in contrast, the cost of domestic crude oil increased. Three measures may be used to shed light on the cost of U.S. crude oil imports. Two are foreign crude oil prices: the OPEC average price, and the price of Saudi Arabian Light, which is referred to as the OPEC benchmark (table 2). The former was within a few cents of the average of $12.94 per barrel, and the latter was steady at $12.70 per barrel. The stability of OPEC prices reflected the continuing surplus of crude oil on the world market. The refiner acquisition cost for imported crude oil, the third measure, is shown in chart 12. It is a weighted average that reflects shifting grades and sources of crude oil imported to the United States, and includes transportation costs and Federal import fees. It too was steady, at about $14.50 through these three quarters.

Over this period, the refiner acquisition cost of domestic crude oil, which is also shown in chart 12, moved up about $0.35 per barrel, to $10.63, as the result of two factors. First, prices increased for two categories of U.S. crude oil production—lower-tier oil and upper-tier oil; these increases reflected adjustments under the Energy Policy and Conservation Act (EPCA) of 1975. The price of stripper oil, which is exempt from controls and follows world market prices, was about steady. Partly offsetting was a decline in the price of Alaskan North Slope (ANS) oil.[1] Second, the composition of U.S. production shifted toward higher priced supplies. As shown in table 3, the percentage of domestic production that was effectively decontrolled—the percent accounted for largely by stripper and ANS oil—increased from about 25 percent in the first quarter to about 29 percent in the third. It was acquired by refiners at world market prices, rather than at the lower, controlled prices of lower- and upper-tier oil.

In the fourth quarter of 1978, increases in the cost of domestic oil continued and the refiner acquisition cost of imported oil moved up. The cost of imported oil reflected the increase in international spot market prices and an increased volume of spot market purchases. Spot market prices fluctuate with worldwide supply and demand, and can be either above or below contract prices, of which the OPEC prices are representative. The increased volume of spot market purchases reflected buying to beat an expected OPEC price increase for 1979 and replacement of supplies

1. The major categories in 1978, in somewhat simplified terms, were: Lower-tier, or old, oil is that from properties producing in 1972; upper-tier, or new, oil is that production in excess of 1972 levels, and from properties that began producing after 1972; stripper oil is that from very low yield wells (10 barrels a day or less); and Alaskan North Slope oil.

Summary of Major Legislation Affecting Energy Prices

Energy Policy and Conservation Act (EPCA) of 1975, passed in December 1975, superseded the Emergency Petroleum Allocation Act of 1973. It continued Federal controls on the price of domestic crude oil; only the price of stripper oil (production from wells that yield less than 10 barrels per day) was left uncontrolled. Ceiling prices, set for categories largely based on time of discovery, were to be adjusted monthly to allow for inflation, and could be increased to provide an incentive to production. Price controls were mandated until June 1, 1979; they were to be discretionary until expiration of the price control provision of the EPCA on September 30, 1981.

Other major provisions authorized removal of controls on the prices of petroleum products and on the allocation of these products among consumers; established mandatory fuel economy standards for new automobiles; provided for the creation of the Strategic Petroleum Reserve; expanded authority to order major powerplants and fuel burning installations to switch to coal from oil or natural gas; increased Presidential authority to control the flow of energy supplies and energy-related materials; and provided standby powers to deal with an energy emergency.

The Federal Energy Administration, the predecessor of the Department of Energy, acted under the authority of the EPCA to eliminate price and allocation controls except on crude oil, gasoline, and propane (1976 for most petroleum products; 1979 for jet fuel, natural gasoline, and butane); to continue authorization of a 10-percent increase in the average price of a barrel of domestic crude oil (1977); and to phase out crude oil price controls (1979).

National Energy Act of 1978, passed in October 1978, was a five-part package:

Natural Gas Policy Act extended Federal jurisdiction to intrastate natural gas supplies; established ceiling prices for various categories of gas, some of which were to be deregulated in January 1985; and provided for the establishment of "incremental pricing"—a system of surcharges levied on industrial users of natural gas to reduce price increases for residential and small commercial users.

Powerplant and Industrial Fuel Use Act required that new industrial and utility plants use coal or some fuel other than petroleum and natural gas, and that most existing utility plants and, where feasible, industrial plants make the switch by 1990.

Public Utility Regulatory Policies Act required that State regulatory authorities consider new rate structures, such as "time-of-day" rates, that promote energy conservation.

National Energy Conservation Policy Act provided a series of general conservation measures, such as requiring utilities to provide information on conservation to consumers and arrange financing for residential users to install energy-saving insulation.

Energy Tax Act provided tax credits for installation of energy-saving devices on residences and small businesses, tax incentives for the production of synthetic fuels, and the exemption of gasohol from the 4 cents per gallon Federal excise tax.

Chronology of Energy-Related Events

	Domestic	International
1978		
January		Several OPEC members cut official prices or offer discounts on crude oil purchased under contract, after failing to agree on any price changes at their meeting in December.
March	Record-long (112-day) coal strike by 160,000 members of the United Mine Workers Union is settled. The striking miners normally account for about one-half of total bituminous (soft) coal production.	
April		OPEC members cut official prices on second-quarter sales of crude oil.
June		OPEC members again fail to agree on any price changes for 1978.
October		Strikes by Iranian oilfield workers begin to disrupt production.
December	Some temporary supply allocation cuts to gasoline retailers occur, due to a shortage of premium unleaded gasoline.	Exports of crude oil from Iran are halted.
	Presidential proclamation exempts imports of residual (heavy) fuel oil into the East Coast from import fees of 63 cents per barrel. (Residual fuel oil is used by utilities for electricity production.)	OPEC announces a 14½-percent increase in the price of crude oil, to be implemented in quarterly installments by October 1, 1979.
	The higher priced intrastate natural gas markets are merged with the interstate market under the NGPA.	
1979		
January	DOE regulation allows gasoline retailers to pass through rent increases and the cost of vapor recovery systems. (These passthroughs are replaced by a maximum allowable gross margin in August.)	OPEC members increase crude oil prices an average of 5 percent.
March	DOE regulation allows U.S. refiners to "tilt" toward gasoline the increases in their crude oil and processing costs incurred since January 1.	Exports of crude oil from Iran are resumed.
		OPEC announces a second-quarter price increase of about 9 percent, bringing the benchmark crude, Saudi Arabian Light, up to the previous scheduled fourth-quarter 1979 level. In addition, individual members add premiums of $1.20 to $4.00 per barrel.
April	Import fees under the Mandatory Oil Import Program, and Congressionally imposed customs duties, are suspended.	OPEC countries' crude oil prices increase 14½ percent from March.
May	DOE implements a $5 per barrel import entitlement to subsidize imports of middle distillates (heating oil). It is originally scheduled to end August 31, but is extended through October 31.	Canada increases its natural gas export price 6½ percent. (Canadian natural gas accounts for about 5 percent of U.S. natural gas consumption.)
	Gasoline and diesel fuel shortages develop in some areas and continue through the summer.	OPEC countries' crude oil prices increase 2½ percent from April.
	DOE interim rule implements the Powerplant and Industrial Fuel Use Act of 1978, which prohibits or restricts the use of petroleum and natural gas by certain electric powerplants and industrial fuel-burning installations.	
June	The first phase of the decontrol of domestic crude oil prices begins under the EPCA. Two new categories—newly discovered and incremental tertiary—are exempt from price controls; 30 percent of a third category—marginal property—receives the upper-tier price. Only a small amount of production is initially affected.	OPEC members announce price increases effective July 1; Saudi Arabia's is retroactive to June 1. The OPEC average price increases 13½ percent from May.
July		Saudi Arabia increases oil production temporarily by one million barrels per day. (The increased output is maintained through at least the third quarter of 1990.)
		OPEC countries' crude oil prices increase 7½ percent from June.
		Mexico increases crude oil prices 32 percent. (Mexican supplies are 5–7 percent of total U.S. crude oil imports.)
August	A maximum allowable gross margin on retail gasoline sales becomes mandatory, replacing the system of "banking" (which allowed retailers to increase prices to make up for gasoline they sold previously at less than ceiling prices). The gross margin is to be adjusted semiannually.	Canada increases its natural gas export price 22 percent.
	The heavy grades of domestic crude oil are exempted from price controls by Presidential order.	
September		OPEC members tighten credit payment terms, increasing the cost of financing crude oil purchases.
		Canada announces a fourth-quarter cutback in exports of light crude oil to the U.S.; exports are virtually stopped in November and December. Exports of heavy crude oil are increased for the fourth quarter.
October		OPEC countries' crude oil prices increase 3½ percent from September.
November	Price controls for "deep" gas and three other categories of domestic natural gas are lifted under provisions of the NGPA.	U.S. embargo of Iranian oil begins November 12; Iranian oil already in transit continues to arrive for several weeks.
		OPEC countries' crude oil prices increase 16½ percent from October.
		Canada increases its natural gas export price 33 percent.
December	DOE allows a 2-cent per gallon price increase for incremental production of unleaded gasoline, and the passthrough of the cost of ethanol used in gasohol and other additives used in gasoline production. The increases may be spread over all grades of gasoline. Previously, only part of the cost of producing gasoline could be passed through to gasoline; the rest was to be passed through to other products.	OPEC fails to reestablish pricing uniformity. Members unilaterally announce crude oil price increases of up to one-third, with effective dates from as early as November 1. OPEC countries' crude oil prices increase 6 percent from November.
	The first semiannual adjustment to the maximum allowable gross margin for gasoline retailers is made; the margin is increased 4½ percent.	
	DOE expands the range of heavy grades of domestic crude oil that is exempt from price controls.	

Chronology of Energy-Related Events—Continued

	Domestic	International
1980		
January	The first phase of the incremental pricing program under the NGPA takes full effect. Surcharges on industrial users (excluding electric utilities) are used to shelter residential and small commercial users from the incentive prices allowed on new supplies of natural gas. The second phase of the decontrol of U.S. crude oil prices begins: transfer of upper-tier oil to uncontrolled status in equal monthly increments, and an increase in the rate of transfer of lower-tier oil to upper-tier status.	Imports of a small quantity of Mexican natural gas begin. The price is substantially above prices for some domestic supplies. OPEC countries' crude oil prices increase 9½ percent from December.
February		OPEC countries' crude oil prices increase 3 percent from January.
March		Mexico increases its natural gas export price 23 percent to match the price of Canadian natural gas.
April		OPEC countries' crude oil prices increase 2½ percent from March.
May	DOE regulation provides gasoline wholesalers with the option of using a maximum allowable gross margin similar to the one established in August 1979 for retailers.	OPEC countries' crude oil prices increase 2½ percent from April.
June	Semiannual adjustments are made in the maximum allowable gross margins for gasoline wholesalers (up 6¼ percent) and retailers (up 4½ percent).	OPEC countries' crude oil prices increase 1½ percent from May.
July	Customs duties on imported crude oil and products, ranging from 5½ to 52½ cents per barrel, are reimposed; they were first imposed in 1973, and suspended in April 1979. Refiners cut prices they offer for supplies of domestic uncontrolled crude oil.	OPEC countries' crude oil prices increase 1½ percent from June.
August	Refiners cut wholesale gasoline prices and continue to cut the prices they offer for supplies of domestic uncontrolled crude oil.	Retroactive Saudi Arabian crude oil price increase of 7 percent takes effect.
September	Refiners continue to cut both wholesale gasoline prices and the prices they offer for supplies of domestic uncontrolled crude oil.	OPEC members agree to a crude oil price freeze for the remainder of the year for all members except Saudi Arabia; Saudia Arabia announces a retroactive price increase. War erupts between Iran and Iraq. Facilities for oil production, refining, and shipment are damaged in both countries; exports are cut off.

NOTE.—DOE is Department of Energy.
EPCA is Energy Policy and Conservation Act of 1975.
NGPA is Natural Gas Policy Act of 1978.

OPEC is Organization of Petroleum Exporting Countries. OPEC members are: Algeria, Ecuador, Gabon, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, the United Arab Emirates (Abu Dhabi, Dubai, and Sharjah), and Venezuela.
Price increases are not at annual rates.

lost due to strikes by Iranian oilfield workers.

Throughout 1979, prices of both imported and domestic crude oil moved up. OPEC as well as non-OPEC crude oil producers raised prices. The OPEC average price increased from $13.79 per barrel in the first quarter to $23.54 in the fourth. In addition, OPEC countries offered a larger proportion of their exports for sale at spot market prices, which were well above contract prices, and tightened credit payment terms, which increased financing costs. The refiner acquisition cost of domestic oil increased from $11.27 per barrel in the first quarter to $17.81 in the fourth. The increase was due to continued shifts in the composition of production and price increases for each category. Prices of categories that were effectively uncontrolled more than doubled during the year; the percentage of such production increased from 30 percent in the first quarter to 44 percent in the fourth. Part of the compositional shift was due to the addition of new uncontrolled categories. The addition of these new categories, in June and September, was one of the first steps in the crude oil decontrol program to be carried out under the EPCA. The program became effective in June and is to achieve complete decontrol by September 30, 1981.

In the first quarter of 1980, increases in the costs of imported and domestic crude oil accelerated. A series of crude oil price increases was announced by

Table 2.—Oil Prices, Production, and Stocks

	Units	1978				1979				1980	
		I	II	III	IV	I	II	III	IV	I	II
Imported crude oil prices:	$/barrel										
OPEC average		13.06	12.94	12.92	12.91	13.79	17.06	20.14	23.54	28.72	30.41
Saudi Arabian Light		12.70	12.70	12.70	12.70	13.34	16.66	19.00	22.00	26.00	28.00
Crude oil production:	million barrels/day										
World		57.8	56.9	60.6	62.7	60.7	62.6	62.0	63.3	r 61.9	r 60.1
OPEC		28.3	26.5	30.1	31.4	29.5	31.1	31.2	31.0	29.5	27.6
U.S.		8.5	8.5	8.5	8.7	8.5	8.5	8.5	8.6	r 8.6	r 8.6
U.S. production of petroleum products:	million barrels/day										
Gasoline		6.8	7.0	7.4	7.5	7.0	6.8	6.8	6.7	6.3	6.4
Distillate fuel oil		3.0	3.1	3.2	3.3	3.0	3.0	3.3	3.2	2.8	2.6
U.S. stocks of crude oil and petroleum products at primary level:	million barrels										
Crude oil		345.5	333.3	321.2	309.4	317.4	325.0	328.9	r 339.1	361.7	382.1
Gasoline		230.8	219.4	216.5	226.0	239.2	229.3	228.0	237.5	252.7	264.6
Distillate fuel oil		137.3	157.2	220.7	208.4	112.7	141.4	220.3	223.7	177.7	104.3

r Preliminary.

Sources: Central Intelligence Agency and Department of Energy.

individual OPEC and non-OPEC producers, beginning in December 1979. Some increases were made retroactive to November 1, so that despite lags in the transportation and financing of crude oil imports, first-quarter petroleum product prices were affected from the start of the quarter. The gap between the OPEC benchmark and the OPEC average widened substantially as the OPEC pricing structure broke down further. The OPEC average reached $28.72 per barrel. The embargo of Iranian oil, which began November 12, 1979, had only a small impact on the cost of U.S. crude oil imports. A large impact had been expected, because replacement of Iranian supplies would come from the spot market, but reduced speculation in the spot market narrowed the gap between contract and spot market prices.

Table 3.—Crude Oil Purchased at the Wellhead: Domestic Price in Dollars Per Barrel and Percentage of Domestic Production by Category

	Lower-tier		Upper-tier		Stripper		Alaskan North Slope		Domestic average	Effectively uncontrolled crude oil[2]
	Price	Percent	Price	Percent	Price	Percent	Price	Percent	Price	Percent
1977: IV	5.21	41.4	11.60	34.6	13.99	13.0	6.04	16.0	8.74	24
1978: I	5.30	40.6	11.82	34.2	13.92	13.5	5.23	19.6	8.77	26
II	5.40	37.6	12.00	34.4	13.94	13.8	5.22	13.5	8.89	28
III	5.50	36.7	12.24	34.5	13.95	14.1	5.18	13.6	9.05	29
IV	5.64	35.4	12.41	34.6	14.00	14.7	5.24	14.2	9.28	30
1979: I	5.78	35.1	13.76	34.6	14.77	14.7	6.11	14.4	9.66	30
II	5.94	32.5	13.63	34.0	15.16	15.6	8.30	14.3	10.91	32
III	6.06	25.8	13.32	26.0	15.85	16.5	13.53	15.9	13.99	36
IV	6.14	22.9	13.67	22.8	16.69	16.0	13.40	16.8	15.89	44
1980: I	6.32	20.5	13.96	23.6	26.14	15.5	19.77	16.0	18.67	50
April	6.37	18.7	14.18	25.0	35.54	15.9	14.07	14.9	20.29	55
May*	6.47	17.6	14.29	25.2	35.11	15.4	14.36	12.5	21.00	57

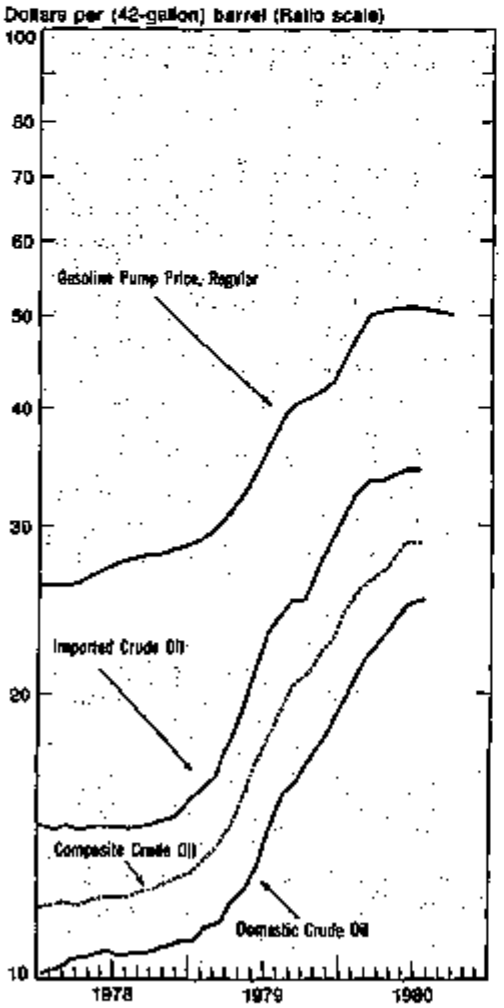
* Preliminary
1. Price-controlled Alaskan North Slope (ANS) crude oil cannot sell, at wellhead, above the upper-tier price; however, the refiner acquisition cost for ANS crude oil, which includes the high cost of transportation, is that of uncontrolled crude oil.
2. Includes ANS. See footnote 1.

NOTE.—Percentages do not add to 100 percent, because the Naval Petroleum Reserve, which accounted for less than 2 percent of domestic production in 1978, is not shown separately and because new categories were added in June and September 1979. The percentage accounted for by the latter increased to 27 percent in May.

Source: Department of Energy.

CHART 12

U.S. Gasoline and Crude Oil Prices[1]



1. Gasoline prices include taxes. Crude oil prices are crude oil refiner acquisition costs, including transportation costs.

Data: Department of Energy and Oil and Gas Journal

U.S. Department of Commerce, Bureau of Economic Analysis 80-10-12

The compositional shift towards higher priced domestic supplies accelerated in the first quarter of 1980 under the second phase of the crude oil decontrol program. In the second phase, which began January 1, upper-tier oil is transferred to uncontrolled status in equal monthly installments and the rate of transfer of lower-tier oil to upper-tier status is stepped up. The refiner acquisition cost of domestic oil reached $21.02 per barrel.

In the second and third quarters, crude oil price increases decelerated. The major factors underlying the deceleration were the effects of weakening economic activity and price-induced conservation on world demand. Stocks of crude oil and petroleum products were high. In the third quarter, domestic refiners cut the price they offered for uncontrolled domestic crude oil, and some spot market prices fell below contract prices. Cuts in production by OPEC members—second-quarter OPEC production was lower than in other quarters of the period—were followed by some third-quarter cuts in premiums on their oil prices. In September, OPEC members agreed to a price freeze for the remainder of the year, for all members except Saudi Arabia; Saudi Arabia increased its prices 7 percent ($2 per barrel) retroactive to August 1 to aline them better with those of other members. The outbreak of war between Iran and Iraq later in September did not have any immediate effect on prices, other than on those in the spot market.

Gasoline and oil

The price of gasoline is subject to Federal controls at all levels of production and distribution. It is linked to crude oil, which is subject to several types of regulation, and, unlike other petroleum products, it remains subject to controls regarding refiners' allocations and passthroughs of costs at all levels.

In 1978, prices of gasoline and oil principally reflected the course of crude oil prices: relatively small increases through the third quarter, due to increases in the price of domestic oil, and acceleration in the fourth, due to a step-up in prices of imported oil.

Throughout 1979, gasoline prices reflected increasing retail margins and new refiner cost passthroughs, as well as the continued increases for both imported and domestic crude oil. Federal regulatory changes contributed to the increase in retail margins and allowed refiners to pass through additional costs. In January, retailers were allowed to pass through additional costs, specifi-

cally, rent increases and the cost of vapor recovery systems. In March, the "tilt" regulation permitted refiners to allocate to gasoline prices a larger than proportionate amount of costs. In August, a maximum allowable gross margin on sales became mandatory. It was set at 15.4 cents per gallon, and was to be adjusted semiannually for inflation. It replaced for retailers the system of "banks," which—under the Emergency Petroleum Allocation Act of 1973—allowed retailers (and also refiners and distributors) to "bank" allowable costs that had not been passed through because of softness in gasoline markets. The gross margin was increased 4½ percent in December, to 16.1 cents per gallon. Also, beginning in December refiners were allowed to increase prices on stepped-up production of unleaded gasoline, and to pass through the cost of ethanol used for gasohol production and other additives used for gasoline production.

The shortages of gasoline that developed in some areas of the country in May and continued through the summer also contributed to the increase in retail margins. Several factors were responsible for the shortages. First, crude oil supplies were tight. Supplies from Iran had been disrupted and U.S. production in the second and third quarters was below year earlier levels. Second, refiners were reluctant to purchase higher priced spot market supplies of crude oil because such purchases would have put upward pressure on spot market and contract crude oil prices. Third, beginning in April, refiners were encouraged by the Federal Government to replenish stocks of heating oil, which were drawn down during the severe winter. Because fuel oil and gasoline are joint products of the refining process, the increased volume of fuel production was obtained at the expense of gasoline production. Fourth, refiners' allocations to retailers, which are federally regulated, did not fully take into account rapid growth of consumption in some areas. Finally, as shortages became apparent, demand increased sharply but temporarily as consumers "topped off" their gasoline tanks.

Table 4.—PCE Energy

[Billions of constant (1972) dollars]

	1978				1979				1980		
	I	II	III	IV	I	II	III	IV	I	II	IIIp
	Seasonally adjusted annual rates										
Total	57.5	58.4	56.2	57.5	59.6	55.3	54.5	54.9	51.9	50.9	50.4
Gasoline and oil	27.0	27.6	25.3	26.1	29.1	25.1	25.3	25.3	23.3	24.0	23.6
Fuel oil and coal	5.9	5.7	5.3	5.2	5.5	5.3	5.2	4.9	4.6	4.5	4.6
Electricity	17.2	16.8	16.2	16.7	16.0	17.1	17.0	17.1	16.9	16.1	16.5
Natural gas	7.3	8.4	6.4	6.5	7.1	6.8	6.6	6.4	6.1	6.2	6.2
	Change from preceding quarter										
Total	2.7	−2.1	0.8	1.3	2.3	−4.5	0.8	0.4	−2.1	−1.0	−0.4
Gasoline and oil	.2	.4	.3	.0	.6	−2.9	−.3	0	−.5	−1.2	−1.8
Fuel oil and coal	.6	−.2	−.5	−.1	.3	−.2	−.1	−.4	−.2	−.1	.1
Electricity	1.2	−1.4	.5	.4	1.3	−1.0	−.1	.1	−1.2	.2	.4
Natural gas	.8	−1.0	0	.1	.4	−.4	−.2	−.2	−.3	.2	0

In 1980, gasoline price changes covered an unusually wide range: The 82½ percent annual rate increase in the first quarter was the largest increase in the period; a substantial deceleration occurred in the second quarter; and the only decline in the period—7 percent—was registered in the third quarter. Price increases for both imported and domestic oil were unusually large in the first quarter. Thereafter, gasoline prices reflected smaller increases for imported oil and the emergence of more competitive conditions in the retail gasoline market. Over the period of sharp increases in gasoline prices, from the first quarter of 1979 to the first of 1980, these prices increased over 60 percent. Stated in terms of the pump price of regular gasoline the increase was $0.45 per gallon—from $0.70 per gallon in the first quarter of 1979 to about $1.15 in the first quarter of 1980.[2] Mainly as a reaction to these increases, gasoline consumption declined sharply. As measured by real PCE, consumption declined 15 percent through the first quarter, and continued to decline in the second and third quarters (table 4). These reductions, in combination with high stocks, led some refiners to cut wholesale prices and some retailers to cut margins.

2. The pump price of regular gasoline is shown in chart 12, where it, like the price of crude oil, is measured in terms of dollars per 42-gallon barrel. The increasing share of the price of crude oil in the pump price, which is apparent in the chart over most of the period, reflects the fact that some of the difference between the two prices consists of items that, at least in the short run, are fixed in dollars. Federal and State and local taxes are an example.

Fuel oil and coal

In contrast to gasoline, fuel oil is not subject to Federal price and allocation controls. However, as a refined petroleum product, it is linked to crude oil, which is subject to several types of regulation. The link is more direct than in the case of gasoline, because the cost of crude oil makes up a much larger part of the consumers' price of fuel oil. Accordingly, fuel oil prices in 1978–80 reflected the increases for domestic and imported crude oil described earlier—that is, relatively small price increases through the third quarter of 1978, sharply accelerating increases through the third quarter of 1979, and increases thereafter that were lower than in the third quarter but still large. In addition, severe winter weather resulted in a drawdown of distillate stocks in the first quarter of both 1978 and 1979, putting upward pressure on fuel oil prices.

As a result of the 1979 drawdown, Federal actions were taken in mid-1979 to stimulate the replenishment of fuel oil stocks. First, in May, an "entitlement" subsidizing imports of middle distillates (fuel oil or heating oil) was introduced to reduce the disparity between the prices of imported and domestically refined heating oil. The costs were absorbed by domestic refiners. Second, as mentioned earlier, refiners were encouraged to increase production of fuel oil at the expense of gasoline production.

A subsequent buildup of stocks, a milder than usual winter, and continuing price-induced conservation and conversion to natural gas helped hold down fuel oil price increases in 1980. Conversion to natural gas has been particularly important in the Northeast, where reliance on imports of crude oil and petroleum products is greatest.

Electricity

Retail electricity rates are regulated by State utility commissions. However, in most States full-scale hearings are not always required for utilities to increase rates, because fuel adjustment clauses permit them to pass through increased fuel costs. Wholesale rates for interstate sales are federally regulated. Electricity rates are also affected by Federal regulation of energy inputs to electricity production. Changes in the prices of the principal inputs—coal, petroleum, and natural gas, which in terms of kilowatt-hours produced account, respectively, for about 45, 15, and 15 percent of production—are shown in chart 13. Of these inputs, only coal is not federally regulated.

In the first two quarters of 1978, electricity prices rose faster than those of the other PCE energy components, mainly as a result of the effects of the record-long coal strike from December 1977 to March 1978. Higher electricity prices reflected utilities' substitution of higher priced power on a short-term emergency basis from utilities less affected by the strike. Also, as a result of coal shortages caused by the strike and of higher labor costs established in the miners' new contract, the price increase for coal used by electric utilities accelerated sharply in the second quarter and was high also in the third.

There was upward pressure on first-quarter 1978 electricity prices also because of strong consumer demand—as evidenced by real PCE on electricity—during severe winter weather. Less efficient plants—often those using higher priced energy inputs—were brought into operation. In some cases the increased costs were passed through to consumers through fuel adjustment clauses; in others, a longer lag occurred because rate increases had to be approved by State utility commissions. Increased costs were passed through either as a lump sum, or a surcharge extended over several months.

Third- and fourth-quarter changes in 1978 include some effect of seasonal pricing—a step-up in rates during summer months when demand for electricity is larger because of its heavy use in air conditioning and a step-down during winter months. (The second-quarter increase was also affected, but to a smaller extent.) Data for preceding years did not show sufficient evidence of a seasonal pattern to require seasonal adjustment. The decline in the fourth quarter also included rebates by some utilities; some fuel adjustment charges imposed during or after the coal strike were subsequently found to be larger than warranted.

In 1979, substantial price increases for crude oil and natural gas, shown in chart 13, and for petroleum products such as residual fuel, resulted in somewhat higher price increases for electricity. In addition, several factors influenced the quarterly pattern. A second winter of severe weather put upward pressure on prices in the first quarter. An accident at the Three Mile Island nuclear plant in March, which resulted in temporary shutdowns of other nuclear plants, had an effect similar to that of the previous year's coal strike: Utilities were forced to substitute less efficient powerplants and higher priced fuels. The second- and third-quarter increases were partly due to the introduction of high summer rates; seasonal adjustment of electricity prices began with the fourth-quarter data.

In 1980, electricity price increases again mainly reflected price increases for the energy inputs. Weather abnormalities were also a factor. A warm winter held down demand in the first quarter. In the second and third quarters, demand was high, because of the extensive use of air conditioning during a heat wave and drought that began in June. Also, hydroelectric production in some areas was cut by the drought, causing increased reliance on higher priced energy inputs.

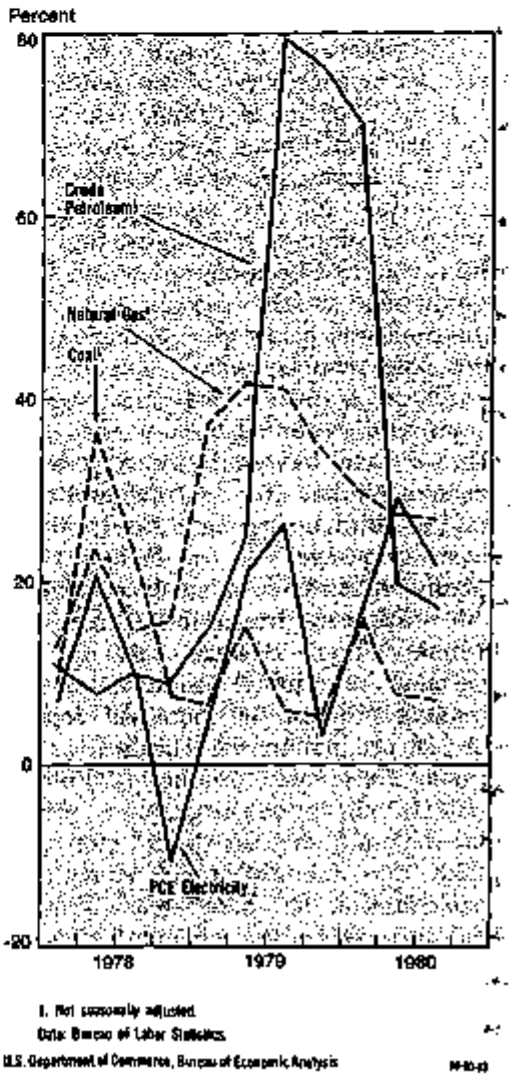
Natural gas

The price of natural gas is affected by the prices of domestic supplies as well as those of natural gas imports, which are principally from Canada. The cost of natural gas accounted for an increasing share of the residential price: 36 percent in 1978, 42 percent in 1979, and 46 percent in early 1980. The remaining costs are for transportation by pipeline and for distribution. At the distribution level, gas utilities' rates are subject to regulation by State utility commissions.

Prior to the passage of the Natural Gas Policy Act of 1978 (NGPA), two markets existed for supplies of domestic natural gas. The interstate market was

CHART 13

Prices for PCE Electricity and Principle Energy Inputs to Electricity Production: Change From Preceding Quarter



1. Not seasonally adjusted.

Data: Bureau of Labor Statistics.

U.S. Department of Commerce, Bureau of Economic Analysis

subject to Federal regulation; the intrastate market was subject to State regulations. Price differentials led to shortages in the interstate market, where the maximum prices were set at relatively low levels, and surpluses in the intrastate market. The NGPA, a part of the National Energy Act of 1978, extended Federal price controls to the intrastate market and set prices designed to stimulate production of some categories of gas. An incremental pricing program, implemented only in 1980, passed high prices for newly discovered supplies to industrial users.

In 1978, supplies were tight in the interstate market. Tightness due to price disparities between the two markets had been accentuated in the first quarter by increased residential consumption during severe winter weather. In periods of high demand, such as in the first quarter, auxiliary sources of gas are used to supplement primary sources. In 1978, intrastate gas was purchased under Federal regulations that allow emergency purchases for periods up to 60 days. Tightness persisted through the first three quarters and well into the fourth. On December 1, provisions of the NGPA took effect; natural gas prices rose, and the distribution of supplies was improved.

In 1979, price increases accelerated. Domestic prices were affected by monthly inflation adjustments under the NGPA as well as decontrol of four categories of gas in November. Also, import prices increased. Demand for natural gas continued strong. There was a second winter of severe weather, and, as a result of the even sharper price increases for fuel oil, a large number of residences were converted from fuel oil to natural gas. The number of residential natural gas customers increased by about 500,000 in 1979.

Natural gas prices continued to increase in 1980. Prices of domestic gas rose under the NGPA, and there were substantial increases in the price of natural gas imports. Areas heavily dependent on Canadian natural gas were strongly affected by a 30-percent price increase in February. Conversion from fuel oil to natural gas heating continued; the number of residential customers increased 600,000 in the first quarter and 200,000 in the second. In the first quarter, however, consumer demand was held down by warmer-than-average weather. Conservation by consumers also helped limit 1980 price increases.